

REMARKS

This Amendment is submitted in response to the Office Action mailed December 17, 2002, wherein the drawings were objected to under 37 C.F.R. §1.83(a) as not showing every feature of the claimed invention, Claims 17 – 34 were objected to due to an informality in Claim 17, wherein Claims 27 – 29 were rejected under 35 U.S.C. §112, second paragraph as being indefinite, Claim 17 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,396,397 to McClanahan, *et al.* ("McClanahan") Claims 17 – 34 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,170,154 to Swarup ("Swarup"), and Claims 17, 27, 30, 33, and 34 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,157,589 to Cole, *et al.* ("Cole"). In response, the Claims, Specification and Drawings have been amended. These amendments are in compliance with the REVISED MANNER OF MAKING AMENDMENTS procedure described in the M.P.E.P. §714(III). Applicants respectfully submit that no new matter has been entered by the amendments. Claims 1 – 16 and 35 were previously withdrawn from further consideration. Claims 17-34 are pending.

SUBSTITUTE DRAWINGS AND OBJECTION TO THE DRAWINGS

The Applicants herewith present substitute Drawings for this application, including the original Figures 1-8 and 10-13, a replacement Figure 9, and a new Figure 14. No new matter has been introduced in the substitute Drawings.

The Examiner has raised four objections to the Drawings under 37 C.F.R. §1.83(a), asserting that several features of the claims are not present therein. Specifically, the Examiner has objected to the Drawings for not showing features of Claim 19 (referred to herein as objection (a)), Claim 25 (objection (b)), Claim 26 (objection (c)), and Claims 27-29 (objection (d)). For the reasons presented subsequently, the Applicants traverse objections (a) and (b). In response to objection (c) a new Figure 14 and a corresponding description in the Specification is presented herein. In response to objection (d), the replacement Figure 9 and the corresponding description in the Specification have been amended. As noted above, neither the amendments to Figure 9 nor the new Figure 13 represent new matter.

In objection (a), the Examiner asserts that the Drawings do not show "said circuit board substrate comprises a multi-layer core substrate" of Claim 19. As noted in the specification, "[t]he circuit board substrate may comprise a multi-layer core substrate and include at least one

via passing through the circuit board from the first substrate surface to the second substrate surface" (page 3, lines 17 – 19). These features are shown in FIG. 10, which the BRIEF DESCRIPTION OF THE DRAWINGS describes as containing a side elevational view of a multi-layer core substrate assembly having an upper and lower metal layer and a conducting-through via. More specifically, as described in the first paragraph of page 7, "core 12 may contain multi-layers, as best shown in Fig. 10 where core 12 is shown as comprising a metal layer 12c and core layers 12d and 12e." Thus FIG. 10 shows that one embodiment of the invention includes a circuit board substrate, which is also referred to as core 12, that is a multi-layer core substrate. Applicants respectfully submit that the Figures show the claimed features of Claim 19, and request that the Examiner withdraw the objection to the Drawings under 37 C.F.R. §1.83(a).

In objection (b), the Examiner asserts that the Drawings do not show "said exposed portion of said second substrate surface includes a cavity" of Claim 25. As noted on at the beginning of the second paragraph on page 7: "[t]he metal layers 14 and 16 may be appropriately patterned with any suitable photoresist to respectively, selectively expose substrate surfaces 12a and 12b." Further, in reference to FIG. 12, at page 7, lines 4 and 5 of the third paragraph, the specification states on "[i]n another embodiment of the present invention one or both of the substrate surfaces 12a and 12b may have a cavity, generally illustrated as 24 in Fig. 12. The cavity 24 may be formed by any suitable means, such as by milling, cutting or drilling." Applicants respectfully submit that the Figures show the claimed features of Claim 25, and request that the Examiner withdraw the objection to the Drawings under 37 C.F.R. §1.83(a).

In objection (c), the Examiner asserts that the Drawings do not show "a second integrated electronic component disposed in said cavity" of Claim 26. In response, Applicants have presented new Figure 14 herewith and amended the corresponding description in the Specification by the addition of description of Figure 14 on page 6 of the Specification and the amendment of the third paragraph on page 7 of the Specification.

Support for the new figure and description of the amended specification are found in the patent application as originally filed. Thus, for example, the original Claim 26 recites that the multilayer printed circuit board of the original Claim 25 additionally comprises a second integrated electronic component disposed in said cavity. The arrangement of two prefabricated integrated circuit components disposed within a cavity follows from the description of a single component in a cavity with reference to Figure 13, and is illustrated in the new Figure 14 and

described by the amendments to the third paragraph on page 7 of the Specification, which show and describe. Specifically, FIG. 14 shows a cavity 24 accommodating a first integrated circuit component 20' having pads 26' and a second integrated circuit component 20'' having pads 26''.

Applicants respectfully submit that the new Figure 14 and the corresponding amendment to the Specification show the claimed features of Claim 26, and request that the Examiner withdraw the objection to the Drawings under 37 C.F.R. §1.83(a).

Lastly, in objection (d), the Examiner asserts that the Drawings do not show "at least one first pad disposed on said first integrated electronic component and contacting said metallic layer" of Claims 27 - 29. In response, Applicants have amended Figure 9 and the corresponding description in the Specification in the first paragraph of page 9.

Support for the amended Figure and Specification are found in the patent application as originally filed. Specifically, Claims 27-29 each recite a multilayer printed circuit board additionally comprising at least one first pad disposed on said first integrated electronic component and contacting said metallic layer. In addition, Applicants note that the providing of electrical connections between various points on a dielectric of a circuit board are well known in the art, and are explained, for example, in relation to connecting patterning of layers 40 and 42. The connection of linings 72' and 78', as shown in the amended FIG. 9 is one such possibility for providing contact between pad 26 and layer 40'. Applicants respectfully submit that the amendments to Figure 9 and the corresponding amendment to the Specification show the claimed features of Claim 27-29, and request that the Examiner withdraw the objection to the Drawings under 37 C.F.R. §1.83(a).

OBJECTION TO THE CLAIMS

Claims 17 - 34 were objected to due to informalities in Claim 17. First, the Examiner noted that the word "least" is misspelled in Claim 17, line 5. In response, Applicants have amended Claim 17 accordingly. Second, the Examiner noted that it was not clear which dielectric layer was the second dielectric layer. In response, Applicants have amended the fourth and fifth paragraphs of page 5 to more clearly describe the various layers. These changes are made without the addition of new matter. Applicants believe that the objections have been addressed and requests that the Examiner withdraw the objection.

REJECTION TO THE CLAIMS

Rejections under 35 U.S.C. §112, second paragraph

Claims 27 – 29 were rejected under 35 U.S.C. §112, second paragraph as being indefinite. The Examiner's rejection of Claims 27 – 29 has been addressed in response to objection (d) of the Drawings, as described above, wherein the amendments to Figure 9 and the Specification at the first paragraph of page 9 are described. As such, Claims 27 – 29 are believed to be in condition for allowance.

Specifically, the Examiner noted that the connection between pad 26 and layer 40 was not explicitly shown. Applicants note that the providing of electrical connections between various points on a dielectric of a circuit board are well known in the art, and are explained, for example, in relation to connecting patterning of layers 40 and 42. The connection of linings 72' and 78', as shown in the amended FIG. 9 is one such possibility for providing contact between pad 26 and layer 40'. FIG. 9 and the specification, as amended, are thus supported by the original specification and provide support for Claims 27 – 29.

Rejections under 35 U.S.C. §102

Claim 17 was rejected under 35 U.S.C. §102(b) as being anticipated by McClanahan. In response, Claim 17 has been amended to distinguish the claimed invention from the prior art. Applicants believe that Claim 17 is in condition for allowance.

The Examiner has noted that McClanahan indicates that the metallization layers may be electronic components. Specifically, McClanahan does state that "[t]he metallizations ... *can* form electrical components such as resistors, capacitors, and inductors are compatible with the process used to fabricate the unitized multilayer circuit structure." (col. 4, lines 48-51, emphasis added). McClanahan thus describes a metallization process where the metallic layers, which are formed during the manufacturing of the multi-layer circuit board, act as electrical components.

Claim 17 as amended describes the embedding of an integrated component, "where said first integrated electronic component is a prefabricated component." The device of Claim 17 is a multi-layer circuit board having at least one prefabricated, integrated electronic components electronically integrated into the multi-layer circuit board.

Thus while the prior art may teach the formation of individual components, such as a resistor, a capacitor or an inductor, during the build-up of layers of a multi-layer circuit board, the invention of Claim 17 is directed to and recites the incorporation of prefabricated electronic

components into a circuit board. Thus McClanahan does not teach each and every recitation of the claimed invention. In addition, it would not have been obvious to modify McClanahan to obtain the claimed invention, as McClanahan only teaches the incorporation of individual components into a multi-layer printed circuit board. Since McClanahan fails to teach or make obvious the claimed invention, the rejection of Claim 17, as amended, is respectfully requested to be withdrawn.

Claims 17 – 34 were rejected under 35 U.S.C. §102(e) as being anticipated by Swarup. In response, independent Claim 17 has been amended to distinguish the claimed invention from the prior art. Applicants believe that Claim 17 and dependent claims 18 – 34 are in condition for allowance.

Swarup describes the assembly of a multi-layer circuit board that may include individual components, specifically capacitors and inductors, formed from conducting circuit board layers. In contrast, independent Claim 17, as amended, describes the embedding of an integrated component, "where said first integrated electronic component is a prefabricated component." The integration of prefabricated electronic components is not described or suggested in Swarup, and thus Swarup does not teach each and every recitation of the claimed invention. In addition, it would not have been obvious to modify Swarup to obtain the claimed invention, as Swarup teaches the formation of individual components and not the integration of prefabricated components. Since Swarup fails to teach or make obvious the claimed invention, Applicants respectfully request the Examiner withdraw the rejection of independent claim 17, as amended, and of dependent Claims 18-34, as being anticipated by Swarup.

Claims 17, 27, 30, 33, and 34 were rejected under 35 U.S.C. §102(b) as being anticipated by Cole. This rejection is respectfully traversed as Cole is not anticipatory for the reasons presented below.

Independent Claim 17, as amended, recites, in part, a prefabricated electronic component disposed on a substrate, a dielectric layer disposed on top of the component and the substrate, and a metallic layer over the dielectric layer. Also claimed is a via through the dielectric and connected to the metallic layer, a second dielectric over the metallic layer and the via, and an opening in the dielectric exposing at least a part of the component. Applicants respectfully submit that Cole fails to disclose or teach the claimed structure, and that the Examiner has misinterpreted the Figures of Cole. Contrary to the rejection in the Office Action, element 12 of Cole is a metallization layer (see col. 3, lines 13-14), not a substrate as asserted in the Office